Sigeru DAIGOBO*: **Variation of spore size in the Japanese *Polystichum polyblepharum* group**

大悟法 滋*: イノデ類の胞子の大きさ

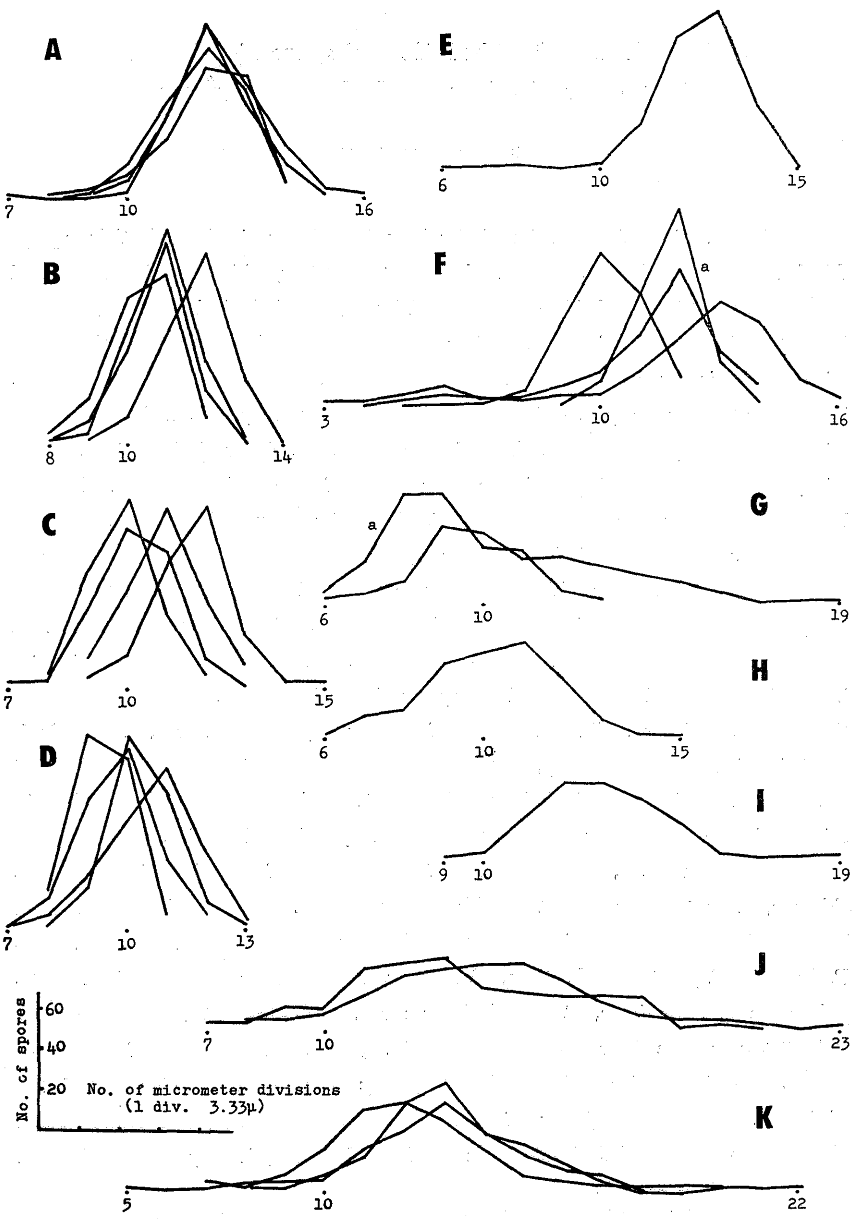
In Japan, 19 species and 5 varieties have been known in the *Polystichum polyblepharum* group (Kurata, 1964), and more than 20 hybrids have been reported among them. These hybrids are presumed by the morphological characters, growth habitats and the shape of spores. Shimura (1964) described two types in the spores of the *Polystichum* complex based on the shape and the germination ratio of them. The one is the regular type, and the other is the irregular type to which the spores of the putative hybrids belong. I tried to compare the size variation of the spores of hybrids with those of normal species by means of graphical expression. I would like to express my sincere thanks to Prof. H. Ito for his valuable advice.

Seventy specimens including 15 species, 3 varieties and 8 putative hybrids were used in the present study. The spores were collected from herbarium specimens. They were mounted in balsam on slideglass and 200 of them were measured at random under a microscope. In normal species, the length of the long axis of a bilateral spore could be measured easily by determining the exospore dimension through the perispore. In the spores of putative hybrids, however, it is difficult to distinguish exospore exactly, so that the measurement of the spore was carried out through the long axis including perispore. Therefore the measurement data in this article are not exactly comparable between hybrids and species.

As shown in fig. 1, A–D, the sizes of the exospore of normal species (*P. microchlamys, P. ovatopaleaceum, P. polyblepharum,* and *P. pseudomakinoi*) tend to be in approximate steep normal curves with relatively narrow range of variation. Also *P. braunii, P. fibrillosopaleaceum, P. igaense, P. longifrons, P. makinoi, P. ovatopaleaceum* var. *coraiense, P. polyblepharum* var. *scabiosum, P. retrosopaleaceum* and *P. tagawanum* show the same type as fig. 1, A-D. In each curve of the normal species, there is the size difference less than 26 μ between the maximum and the minimum. And the majority of spores distributes around the numerical means. Although no exact statistical treatment has been done yet, it may be said that the

---

* Bot. Inst., Fac. of Sci., Tokyo Univ. of Education, Tokyo. 東京教育大学理学部植物学教室。


A
7
10
16
B
8
10
14
C
7
10
15
D
7
10
13
E
6
10
15
F
a
3
10
16
G
a
6
10
19
H
6
10
15
I
9
10
19
J
7
10
23
K
5
10
22
No. of spores
60
40
20
No. of micrometer divisions
(1 div. 3.33μ)

spore size is fairly stable in normal species and that it may be possible to estimate the size by the mean.

On the other hand, the spores of putative hybrids are highly irregular. They have various shapes and sizes, and many of them are dark in color. Many spores are not typically "bean-shaped", but spherical, twisted, or aggregative (fig. 2-A). Fig. 1, G-K are the histograms of the length of whole spore including perispore. They tend to be in much broader curves than in the case of normal species. Spores of other putative hybrids, namely *P. inadae*, *P. izuense* and *P. ongataense* show the same type of curves as fig. 1, G-K (*P. mashikoi*, *P. hakonense*, *P. kurokawae*, *P. namegatae* and *P. kiyozumianum*), except one in *P. mashikoi* (fig. 1, G a). In this case, however, it is possible to distinguish it from the normal spore curves by its relatively lower one. As a matter of fact, it is easier to distinguish the spores of hybrids from those of normal species by their external shape and the relatively obscure exospore rather than by the spore size. As regards the size of the irregular spore, the correlation between the fertility and the shape of the spore is more interesting than the variation range itself.

Fig. 1, E and F indicate the exospore lengths of the apogamous species (*P. rigens* and *P. tsussimense*). They show broader curves like those of the spores of the hybrids (except G a). The spores of the apogamous species, however, are "bean-shaped" as the normal species, and it is possible to measure the exospore through the perispore even tiny spores (fig. 2, B). Other apogamous species like *P. kiusiuense*, *P. neolobatum* and *P. tsussimense* var. *mayebarae* show similar curves of size variation as fig. 1,

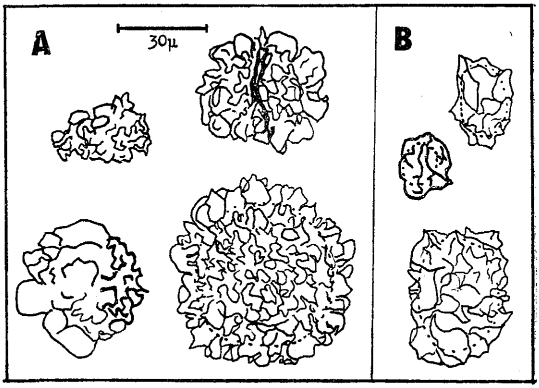


Fig. 2. Spore shape. Dotted lines show exospore outline. A. *P. namegatae* (putative hybrid). B. *P. tsussimense* (apogamous species).

Fig. 1. A-D. Length of the exospore of normal species. A. *P. microchlamys*. B. *P. ovato-paleaceum*. C. *P. polyblepharum*. D. *P. pseudomakinoi*. E, F. That of the exospore of apogamous species. E. *P. rigens*. F. *P. tsussimense*. G-K. Length of the whole spore of putative hybrids including perispore. G. *P. mashikoi*. H. *P. hakonense*. I. *P. kurokawae*. J. *P. namegatae*. K. *P. kiyozumianum*.

E or F. Shimura (1964) treated the spores of apogamous members as the regular type, and did not mention some tiny spores mixed in the spores of normal size. However, it seems to me true that the existence of tiny spores may be one of the characters of apogamous species in the *Polystichum* members.

References

Kurata, S. 1964. Science Report of the Yokosuka City Museum No. 11: 17-41. Shimura, Y. 1964. Bulletin of the Education Faculty, Shizuoka University, Japan, Natural Science Series No. 15: 80-98. Wagner, W. H. Jr. and K. L. Chen. 1965. Amer. Fern Jour. **55**: 9-29.

*　*　*　*　*

日本のイノデ類15種3変種8雑種，70個体の胞子の大きさを測定し，その変異の幅を雑種と推定されている種と普通の種との間で比較し，それをグラフで示すことを試みた。普通の種では山の高い比較的幅の狭いグラフが得られ，雑種とされている種では比較的山の低い幅の広い形を示した。また無配生殖が知られている種の胞子が普通の種と異なる特徴を持つことが観察された。

○花彙に図録されてあるカギカズラ（久内清孝）Kiyotaka HISAUCHI: The drawing of *Uncaria rhynchophylla* Miq. in the Kai (Kwa-wi)

島田充房の著として知らたている花彙8巻は，岩崎常正の本草図譜，飯沼慾斉の草木図説と共に，外国の学者にかなり参照されたことは周知の通りで，そのうち，花彙の図を除いた部分は L. Savatier により，ミヤマイタチシダの学名に名を残している佐波一郎氏の協力で仏訳され Livres Kwa-wi として 1873 に仏国で出版されている。全8巻の内，初篇2巻は島田充房の著で，後篇草部4巻と木部2巻は，小野蘭山の追加したものであることは既知の通りである。最近，必要があって花彙を見ていたら，第4巻にカギカズラの図に，各節に2個ずつ鈎がかいてあるのに気づいた。その説明文を見ると，文中に図をうらがきする記事があった。この鈎は，2個出ている。次は1個でその次は2個，つまり，偶数奇数の順序をくりかえすのが普通であるのに，花彙では，全部偶数になっている。つまり，各節に1対ずつあることになっている。多くのものの中に，そんなのがあるかも知れないが，普通はそうではない。そこで念のためこの部の追補者である蘭山の本草綱目啓蒙 14巻の下 蔓草部 12丁 釣藤の条下を見たら「葉ノ微シ上ノ方ニ対シテ両鈎ヲ生スソノ次ノ節ニハ単鈎ヲ生スマタ其次ニハ両鈎ヲ生ス梢ニ至ルマデ皆此ノゴトシ」とあった。それなのに花彙においては先に記したようになっている。まことにおかしなことである。あるいは，広い自然にはこんなこともあるのかも知れないが，果してどんなものであろうか，この植物が沢山見られる地方の方々の示教をまつ。